

I CLAIM:

Sub 1  
1. A projection system for projecting an image on a curved screen comprising:

an image projector;

the image includes a horizon;

the projector having a centerline of projection;

a lens on the projector;

the lens having an axial centerline parallel to the centerline of projection;

an audience viewing station for one or more viewers of the projected image;

the audience viewing station having a viewing location;

the projector is located at a position away from the viewing location;

the centerline of projection and the axial centerline of the lens are substantially horizontal; and

the axial centerline of the lens is positioned relative to the centerline of projection sufficient to place the horizon on the curved screen at approximately the eye level of a viewer positioned at the viewing location.

2. The projection system of claim 1 wherein the centerline of projection and the axial centerline of the lens are vertically aligned.

3. The projection system of claim 1 wherein the viewing location has a center area.

4. The projection system of claim 3 wherein a viewer is positioned at the center area.

5. The projection system of claim 3 wherein the projector is located at a position away from the center area.

6. The projection system of claim 1 further comprising:  
the curved surface having an uppermost portion when the curved surface is oriented in a position for viewing a projection thereon;

at least two panels forming a portion of the curved surface, each panel having a top edge and bottom edge, the top edge of each panel being nearer to the uppermost portion of the curved surface than the bottom edge of the same panel;

each of the at least two panels having an interior surface facing a viewer at the viewer location;

the interior surface of each of the at least two panels having a reflective portion;

the upper edge of one of the at least two panels being positioned to overlap at least a portion of the bottom edge and at least a portion of the interior surface of another one of the at least two panels, defining an overlapping portion.

7. The projection system of claim 1 wherein the horizon on the curved surface is substantially horizontal.

8. The projection system of claim 1 wherein in plan view the projector lens front is located forward of the viewing location.

9. The projection system of claim 1 wherein the projector lens front is forward of the audience viewing station.

10. The projection system of claim 1 wherein the projector lens projects the image approximately 38 degrees above the horizontal centerline of the curved screen and down to generally 90 degrees below the horizontal centerline of the curved screen.

11. A method for creating in the mind of a viewer a realistic sense of flying over a physical scene having a horizon comprising:

- recording the physical scene on film using a camera and lens;
- during recording maintaining the longitudinal and transverse axes of the camera and lens substantially horizontal;
- during recording maintaining the horizon approximately horizontal and at an approximately consistent position on the film in a vertical direction;
- displaying the recorded scene on the interior of a curved surface using a projector and lens;
- the projector being positioned relative to a viewer location which is positioned relative to the curved surface, with the longitudinal and transverse axes of the projector being substantially horizontal;
- the projector lens axis being positioned relative to the film in the projector a distance sufficient to position the projected horizon at approximately the eye level of a viewer at the viewer location, while maintaining the longitudinal axis of the lens substantially horizontal; and
- the lenses of the camera and projector being matched so that the field of view of the projected image substantially matches the field of view of the recorded image, to the extent the projected image is visible on the curved surface.

12. The method of claim 11 further comprising:

- the curved surface having an uppermost portion when the curved surface is oriented in a position for viewing a projection thereon;

providing at least two panels forming a portion of the curved surface, each panel having a top edge and bottom edge, the top edge of each panel being nearer to the uppermost portion of the curved surface than the bottom edge of the same panel;

each of the at least two panels having an interior surface facing a viewer at the viewer location;

the interior surface of each of the at least two panels having a reflective portion;

the upper edge of one of the at least two panels being positioned to overlap at least a portion of the bottom edge and at least a portion of the interior surface of another one of the at least two panels, defining an overlapping portion.

13. The method of claim 12 further wherein the panel includes at least one aperture.

14. The method of claim 13 further comprising placing an element between the panels at the overlapping portion, the element having a lower reflectivity than the reflective portion of a panel.

15. The method of claim 12 wherein the panel includes a plurality of apertures.

16. The method of claim 15 further comprising placing an element between the panels at the overlapping portion, the element having a lower reflectivity than the reflective portion of a panel.

17. A method for recording an image and projecting the recorded image onto a surface having a curvature, the projected image to be viewed from a viewpoint located in space comprising:

! recording the image on film using a camera and lens, the lens having a front surface closest to the image, the image being located at horizontal and vertical scene angles measured from the center of the front surface of the lens;

during recording maintaining the longitudinal and transverse axes of the camera and lens substantially horizontal;

projecting the recorded image onto the curved surface using a projector and lens;

the projector being positioned relative to the curved surface, with the longitudinal and transverse axes of the projector being substantially horizontal;

projecting the image on the curved surface, the projected image being at horizontal and vertical viewing angles as measured from the viewpoint; and

the horizontal and vertical scene angles and the horizontal and vertical viewing angles being substantially matched.

18. The method of claim 17 wherein the curved surface has a side with a positive radius of curvature, the side with a positive radius of curvature positioned toward the projector.

19. A method for creating in the mind of a viewer a realistic sense of flying over a physical scene comprising:

displaying a recorded scene on the interior of a curved surface using a projector and lens for viewing at a viewing station;

the projector being positioned relative to the viewing station, with the longitudinal and transverse axes of the projector being substantially horizontal;

the projector lens axis being positioned relative to the film in the projector so as to position the projected horizon at approximately the eye level of a viewer at the

viewing station, while maintaining the longitudinal axis of the lens substantially horizontal; and

the lenses of the camera and projector being matched so that the field of view of the projected image substantially matches the field of view of the recorded image, to the extent the projected image is visible on the curved surface.

20. The method of claim 19 wherein the recorded scene was recorded on film using a camera and lens, during recording the longitudinal and transverse axes of the camera and lens were maintained substantially horizontal, and during recording the horizon was maintained approximately horizontal and at an approximately consistent position on the film in a vertical direction.

21. A method for projecting a recorded image of a scene onto a surface having a curvature, the projected image to be viewed from a viewpoint located in space, the scene having been recorded on film using a camera and lens, the lens having a front surface closest to the scene, the scene being located at horizontal and vertical scene angles measured from the center of the front surface of the lens comprising:

projecting the recorded image onto the interior of a curved surface using a projector and lens;

the curved surface being positioned so its curvature is toward the projector;

the projector being positioned relative to the curved surface, with the longitudinal and transverse axes of the projector being substantially horizontal;

the projected image being at horizontal and vertical viewing angles as measured from the viewpoint; and

the horizontal and vertical scene angles and the horizontal and vertical viewing angles being substantially matched.